The Rocket Blog

A blog about anything related to rockets and space technology from news to how to make your own propellant.

TUESDAY, JULY 17, 2012

How to make ammonium perchlorate : electrolysis

As I told you earlier, ammonium perchlorate (AP) is not available in all countries.
Here is a way to make it.

First, AP is made by electrolysis of a solution of sodium chloride (table salt or NaCl).
Electrolysis is made by plunging 2 electrodes (an anode and a cathode) in an electrically conductive solution called electrolyte and plugging these electrodes to a power supply.

The electrolysis of NaCl results in the production of chlorine (Cl) and soda (NaOH). After a number of complex chemical and electrochemical reactions occurs as the chlorine dissolve in the solution.

This will yield sodium chlorate (NaClO3) if you have choose to use sodium chloride in your electrolyte, you can use potassium chloride (KCl) and you will have potassium chlorate (KClO3). But KClO3 solubility is very low compared to NaClO3 so that it will precipitate out of the solution. Not good for making perchlorate as the chlorate needs to be in solution in order to be electrolyzed in perchlorate.

NEVER USE AMMONIUM CHLORIDE (NH4Cl) in the electrolyte because the resulting salt ammonium chlorate is very instable though very dangerous.

Now that the sodium chlorate is made, let run the electrolysis. The chlorate will be electrolyzed to the corresponding perchlorate.

Once the electrolysis done, there is sodium perchlorate in the electrolyte. To obtain ammonium or potassium perchlorate, we will use what is called a double decomposition.
Introduce, either ammonium or potassium chloride in the solution and the corresponding salt will precipitate out as their solubility is very low compared to sodium perchlorate. To finish, extract the perchlorate and let it dry in the sun.

This post was the process of making the perchlorate, further post will cover the details like the electrode's materials (very important) and recycling the solution.

Unknown at Tuesday, July 17, 2012

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22 comments:

Unknown Saturday, June 14, 2014

How much ammonium would need to be introduced per oz of sodium perchlorate solution.

Reply

Replies

Unknown Sunday, June 15, 2014

Thanks for your interest.
To answer you, you would need a stoichiometric amount of ammonium, or in non-chemist terms for 1 g of sodium perchlorate, you add 0.5 g of ammonium chloride.

Unknown Thursday, July 10, 2014

This comment has been removed by the author.

Reply

Unknown Thursday, September 04, 2014

How would I extract the AP from the solution? I was thinking boiling could work or would that cause the AP to decompose.

Reply

Replies

Unknown Thursday, September 04, 2014

Hello,
Actually, you don't have to do this because one of the useful characteristics it has, besides its powerful oxidizing power, is that it is insoluble in water.
So when you add ammonium chloride to your sodium perchlorate solution, AP will precipitate out of solution.
You just have to filter out the AP and you can also reuse the solution for another batch.

Reply

Unknown Saturday, September 06, 2014

Thanks for you help. Sorry to keep asking question I just have two more I need to ask , would I need to run the cell with the save current as I did to make the electrodes? How long does it need to run.

Reply

Replies

Unknown Saturday, September 06, 2014

Well, for the voltage, there is actually no prescription but it should be quite high to avoid oxygen evolution at the anode (like 4V or more, a battery can do it) and I usually run all

night but it all depends on the quantity you are making. The lower the quantity, the lower the time and vice-versa.

Reply

Unknown Sunday, April 05, 2015

thank you.
I'm from Korea, Korean amature attempt KNSB or KNSU.

I learn about it.

I hope you to visit my blog.

http://blog.naver.com/jetspaceship

Reply

Unknown Sunday, June 14, 2015

I just wanted to clear this process up, as i like to double check all of the procedures before hand

1. NaCl is dissolved into water
2. Lead Dioxide and graphite electrodes are used in electrolysis
now i am not sure what is to be done here, as from what i gather i just take the sodium chlorate and use it as electronlite then i add in ammonunium or pottasium chloride and scoop off the resulting preciptate.

Is this correct? sorry for this dumb question but i would just like to clear up the process.

Reply

Replies

Unknown Saturday, April 30, 2016

you must 1st destroy any chlorate remaining b4 you can start making the (ammonium perchlorate) or you will end up with some (ammonium chlorate) that could set the hole thing off causing injury or death. Here are some ways to do it. http://www.oocities.org/capecanaveral/campus/5361/chlorate/destroy.html

Reply

Unknown Friday, April 29, 2016

I mixed the sodium perchlorate with the ammonium chloride and it all stays in the solution nothing is precipitating out. It worked well when i used potassium chloride but not with the ammonium chloride. What do you recommend?

Reply

Replies

Unknown Friday, April 29, 2016

I think that your product is ammonium chlorate which is soluble in water, hence no precipitation.
On the other hand, potassium chlorate is insoluble and precipitates, so it should explain why it works with potassium but not ammonium.
I suggest that you let your electrolysis run longer to see if it works with ammonium chloride.

Unknown Saturday, April 30, 2016

It is perchlorate that can not be burned by sulfuric acid. I ran my cell for a week then boiled down the sodium hypochlorite into sodium chlorate then placed it back in the cell for 5 more days then destroyed the remaining chlorate with hydrochloric acid and a boiling process. like on this page > http://www.oocities.org/capecanaveral/campus/5361/chlorate/destroy.html So i know i have perchlorate not chlorate.

Unknown Monday, May 16, 2016

I should have said can not be burned by low concentrations of sulfuric acid. When I used 98% it smokes and some not all turns yellow but dose not burn.

Reply

Unknown Friday, April 29, 2016

Also what other ammonia salts can be used?

Reply

Replies

Unknown Friday, April 29, 2016

You could use other salts for the double decomposition step such as sulfate.
However, you will end up with a different sodium salt in solution after that.
For example, if you use ammonium sulfate, then the solution will contain sodium sulfate and thus won't be reusable (chloride is needed for electrolysis).
If you don't care about reusing your electrolyte, you could try it but I've never done that, so I can't say if it will be successful.

Unknown Saturday, April 30, 2016

This comment has been removed by the author.

Unknown Saturday, April 30, 2016

I made my ammonium chloride so that my be the problem. I used ammonia and hydrochloric acid to form that salt. Like in this video. https://www.youtube.com/watch?v=Nj_J1U4l_Q0

Reply

Unknown Thursday, July 21, 2016

This may be dumb to ask but do the electrodes have to be lead dioxide and graphite? Or is there any substitutes for these electrodes?

Reply

Replies

Unknown Thursday, July 21, 2016

Those two are the only one I know that works. You could try other materials like steel but it's unlikely to get the job done because it would leach out the iron into the solution (giving you a nice green solution) instead of oxidizing the chloride ion to chlorate and perchlorate ions.

Reply

Unknown Monday, May 29, 2017

I cant find your other post where you cover what to use as electrodes, so which one is the anode and which the cathode? Thanks in advance

Reply

alfachemistry Thursday, March 14, 2019

You may search for our products through the search bar on our website. If you would like to receive a copy of our product catalog, please contact us at info@alfa-chemistry.com. 1-hexyl-2,3-dimethylimidazolium perchlorate

Reply

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